USSR

UDC: 681.3

KORSHUNOV, Yu. M., STEPASHKIN, A. I., VAKARIN, I. A., IOFA, A. L.,, MOLCHADSKIY, L. I., STEPANENKO, V. N., EMIKH, L. A.

"A Digital Spectral Analyzer"

Tr. Ryazan. radiotekhn. in-ta (Works of the Ryazan Radio Engineering Institute), 1970, vyp. 29, pp 158-168 (from RZh-Kibernetika, No 9, Sep 71, Abstract No 9V554)

Translation: The paper describes a model of a specialized digital computer device designed for studying the frequency make-up of random signals. Expressions are presented for estimating the basic parameters of the device under various operating conditions. Authors' abstract.

1/1

USSR

MAKSIMOV, V. S., STEPANENKO, YE. YU.

UDC 532.522:629.015

"Calculating the Hydrodynamics of a Radial-Slot Semibounded Jet"

Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy -- Aviatsionnaya Tekhnika, No 1, 1971, pp 113-120

Abstract: An approximate method of calculating the initial and basic sections of a turbulent radial-slot semibounded jet is discussed. The calculation technique is based on using the integral boundary layer relations. A study is made of the turbulent isothermal jet of constant density emitted from an annular source of finite dimensions and spreading over the surface of a flat shield. As a result of the calculations relations are obtained which define the basic parameters of the jet in the initial and basic sections as a function of the initial conditions. The calculated and experimental data are compared. The comparison is satisfactory.

1/1

USSR

UDC 669.295-41:538.22.082.78

SHISHLYANNIKOV, V. F., BRYUKHANOV, A. A., STEPANENKO, Yu. A.

"Study of the Anisotropy of Magnetic Properties of Titanium Sheets"

Moscow, Zavodskaya Laboratoriya, No 11, 1972, pp 1357-1358.

Abstract: This work studies the anisotropy of the magnetic properties of sheet titanium, and develops a method for testing and analysis of textures formed in titanium sheets during their manufacture. The method is based on radio-frequency study of magnetic anisotropy of textured sheets and other materials with hexagonal latices. The error of measurements does not exceed 1%.

1/1

Radiation Chemistry

USSR UDC 544.6;546.65

SHCHEMELEVA, G. G., BAGDASAROV, R. N., and STEPANENKO, YU. V., Chair of Analytical Chemistry, Rostov-on-Don State University, Rostov-on-Don

"Spectrophotometric Study of the Interaction of Uranium (VI) with 9-p-Nitrophenyl-2,3,7-trihydroxy-6-fluorone"

Ivanovo, Izvestiya Vysshikh Uchebnykh Zavedeniy, Khimiya i Khimicheskaya Tekhnologiya, Vol 16, No 2, 1973, pp 198-201

Abstract: A method for the determination of UO_2^{++} by the reaction with "p-nitrophenylfluorene" (9-p-nitrophenyl-2,3,7-trihydroxy-6-fluorone; I) was developed. To a solution containing 5-50 gamma UO_2, 5 ml of an acetate buffer solution (pH 6.0-6.2) and 3 ml of a solution of I (2×10^{-3} g-mole/l.) in EtOH were added, whereupon the solution was diluted to 25 ml. A raspberry-red color developed, which was due to the formation of a compound of I with UO_2^{++} in a 2:1 ratio. Two H atoms (one per molecule in two molecules of I) were substituted by one UO_2 group; this indicated that I reacted with UO_2^{++} as an orthohydroxyquinone. The colored solution was subjected to spectrophotometry at 530 nm. The dissociation constant of the UO_2-I compound, determined by the 1/2

USSR

SHCHEMELEVA, G. G., et al., Izvestiya Vysshikh Uchebnykh Zavedeniy, Khimiya i Khimicheskaya Tekhnologiya, Vol 16, No 2, 1973, pp 198-210

method of dilution, was 7.9×10^{-15}. The molar coefficient of extinction of the compound, determined according to Komar', was 2.2×10^{-4}. Beer's law applied at U concentrations of 0.2-10 gamma/ml. The relative error of spectrophotometric determinations of U in pure UO_2^{++} salts was $\leq 2.5\%$.

2/2

USSR

SHEMELEVA, G. G., BAGDASAROV, K. N., and STEPANENKO, Yu. V.,
Rostov-NA-Donu State University

UDC 544.6:546.65

"New Extraction-Photometric Method for Determining Uranium in Minerals"

Ivanovo, Khimiya i Khimicheskaya Technologiya, Vol 15, No 10, 1972, pp 1468-1470

Abstract: Uranium may be selectively extracted from a solution of uranium nitrate using tributyl phosphate (TBP) and CCl_4, resulting in a 90% yield. The U(VI) is reacted with p-nitrophenylfluorone (NPF) and the solution analyzed photometrically. Cadmium, zinc, molybdenum (VI), vanadium (V), iron (III), lanthanum, thorium, and zirconium -- in concentrations 1600, 500, 200, 200, 100, 50, 50, and 25 times that of U(VI) respectively -- did not interfere with the photometric determination of the U-NPF complex. This technique was applied to analyzing for U in carnotite; relative error was ±2% for amounts of U ranging from 150 to 450 micrograms.

USSR

UDC 517.51:519.5

STEPANETS, A. I., Institute of Mathematics, Academy of Sciences of the UkrSSR

"Fourier-Series Approximation of Functions Which Satisfy Lipschitz Conditions"

Kiev, Ukrainskiy Matematicheskiy Zhurnal, Vol 24, No 6, 1972, pp 781-799

Abstract: The paper is a continuation of an article published in the previous issue of this journal (A. I. Stepanets, "On a Problem of A. N. Kolmogorov in the Case of Functions of Two Variables", UMZh, Vol 24, No 5, 1972) and utilizes various former results. The principal purpose of the work is establishment of the following theorem: As the natural numbers m and n increase arbitrarily, we have the asymptotic equality

$$\delta_{nm} = \delta(S_{nm}; H^{\alpha,\beta}_{A,B}) = \sup_{f \in H^{\alpha,\beta}_{A,B}} \|f(x;y) - S_{nm}(f;x,y)\|_C =$$

$$= \frac{8}{\pi^4} \ln(2n+1) \ln(2m+1) \int_0^{\frac{\pi}{2}} \int_0^{\frac{\pi}{2}} \min\left\{A\left(\frac{4t}{2n+1}\right)^{\alpha}; \right.$$

1/3

USSR

STEPANETS, A. I., Ukrainskiy Matematicheskiy Zhurnal, Vol 24, No 6, 1972, pp 781-799

$$B\left(\frac{4z}{2m+1}\right)^{\beta}\Big\} \sin t \sin z\,dz\,dt +$$

$$+\frac{A2^{2\alpha+1}\ln(2n+1)}{\pi^2(2n+1)^{\alpha}}\int_0^{\frac{\pi}{2}} t^{\alpha}\sin t\,dt + \frac{B2^{2\beta+1}\ln(2m+1)}{\pi^2(2m+1)^{\beta}}\int_0^{\frac{\pi}{2}} z^{\beta}\sin z\,dz +$$

$$+O\left[\min\left\{\frac{1}{n^{\alpha}};\ \frac{1}{m^{\beta}}\right\}\ln nm + \frac{1}{n^{\alpha}} + \frac{1}{m^{\beta}}\right],$$

where $H_{A,B}^{\alpha,\beta}$ is the class of functions f(x,y) which are periodic with respect to each of the variables with period 2π and satisfy the condition

$$|f(x,y)-f(x',y')| \leqslant A|x-x'|^{\alpha} + B|y-y'|^{\beta};$$

A and B are fixed constants, $0<\alpha,\beta\leqslant 1$;

$$S_{nm}(f;x,y) = \frac{1}{\pi^2}\int_{-\pi}^{\pi}\int_{-\pi}^{\pi} f(t,z)\,D_n(t-x)\,D_m(z-y)\,dt\,dz$$

2/3

USSR

STEPANETS, A. I., Ukrainskiy Matematicheskiy Zhurnal, Vol 24, No 6, 1972, pp 781-799

is the partial sum of order (nm) of the Fourier series of the function $f(x,y)$; $D_i(t)$ is the Dirichlet kernel of order i. The author thanks V. K. Dzyadyk for proposing the topic and for attentive discussion of the results.

3/3

1/2 014 UNCLASSIFIED PROCESSING DATE--20NOV70

TITLE--SUBSTOICHIOMETRIC RADIOACTIVATION DETERMINATION OF CADMIUM AND COPPER IN YTTRIUM BY DISPLACEMENT EXTRACTION CHROMATOGRAPHY -U-

AUTHOR-(02)-YAKOVLEV, YU.V., STEPANETS, O.V.

COUNTRY OF INFO--USSR

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UNCLASSIFIED

2/2 014 UNCLASSIFIED PROCESSING DATE--20NOV70

CIRC ACCESSION NO--AP0126224

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A METHOD IS DESCRIBED FOR THE RADIOACTIVATION DETN. OF CU AND CD IN METALLIC Y BY USING DISPLACEMENT EXTN. CHROMATOG. THE METHOD IS BASED ON THE SUCCESSIVE DISPLACEMENT OF ELEMENTS WITH LOWER EXTN. CONSTS. FROM THEIR COMPLEXES WITH DIETHYLDITHIOCARBAMATE BY SUBSTOICHIOMETRIC AMTS. OF ELEMENTS WITH GREATER EXTN. CONSTS. THE SENSITIVITY OF THE DETN. FROM A 100 MG SAMPLE IS 5 TIMES 10 PRIME NEGATIVE5 PERCENT FOR CU AND 6 TIMES 10 PRIME NEGATIVE5PERCENT FOR CD. FACILITY: INST. GEOCHEM. ANAL. CHEM., MOSCOW, USSR.

UDC: 548.0:538.22

USSR

AL'SHIN, B. I., ZORIN, R. V., DROBYSHEV, L. A., and STEPANISHCHEV, S. V.

"Magnetic Characteristics of Lead Manganate Monocrystals"

Moscow, Kristallografiya, vol 17, No 3, 1972, pp 562-565

Abstract: The monocrystals whose magnetic characteristics are investigated in this paper have the formula $PbMn_2O_4$ and were grown from the solution $PbMn_{2/3}W_{1/3}O_3$ in a PbO-PbF melt in the form of a truncated hexagonal pyramid with a height of about 1 mm and a length of 1.5-2.0 mm along a side of the hexagon. Magnetic measurements of the crystals were made by the Faraday method with twisting weights on a quartz thread in a cryostat to provide a temperature range of 1.5 to 300° K. The measurement results indicated that the material transformed to a weakly ferromagnetic state at a temperature of 63° K, with the spontaneous magnetic moment lying in the base plane of the crystal. Curves are given for the magnetization as a function of the magnetic field in which the crystals were placed and as a function of the field at various temperatures ranging from 30 to 53° K. Investigation of the effect of an electric field on the crystal's magnetic characteristics showed that for an electric field intensity

1/2

USSR

AL'SHIN, B. I., et al, Kristallografiya, vol 17, No 3, 1972, pp 562-565

greater than the critical value, no marked change occurs in the magnetization curves, which fact is interpreted to mean that at temperatures below 39° K the spontaneous magnetic moment is maintained in a definite position by the internal antiferroelectric fields of the crystal.

2/2

UDC 911.3.616-928.6(47+57)

USSR

ARIYEVICH, A. M., STEPANISHCHEVA, Z. G., LYSENKO, A. Ya., MALKINA, A. Ya., AGARUNOVA, Yu. S., DARCHENKOVA, N. N., BARKOV, V. N., and MINSKER, O. B.

"Three-Year Study of Histoplasmosis in the USSR"

V. sb. Materialy Nauchn. konferentsii, posvyashch. 50-letiyu In-ta med. parazitol. i trop. med. (Proceedings of the Scientific Conference Commemorating the 50th Anniversary of the Institute of Medical Parasitology and Tropical Medicine -- collection of works), Moscow, 1970, pp 61-63 (from RZh-36. Meditsinskaya Geografiya, No 1, Jan 71, Abstract No 1.36.124)

Translation: A total of 31 cases of histoplasmosis were recorded in the USSR by the beginning of 1970. Of these, 24 were in Western Siberia. A total of 690 soil specimens were examined, gathered from sites where histoplasmosis was recorded (Tyumenskaya oblast, Turkmen SSR and others) and from sites having no cases (Armenian SSR and the environs of Moscow). The agent of histoplasmosis was isolated from soil of the Turkmen SSR. In one out of 50 house mice (in Turkmen SSR) signs were found of histoplasmosis. Skin tests (176 in Tyumen oblast and 591 in Turkmenia) were made yielding positive results in 2% and 5.6% of the cases studied, respectively.

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USSR

ZABORTsEVA, T. A., et al., Tr. Ryazan. Radiotekhn. in-ta, No 37, 1972, pp 56-62

about the modal composition of the radiation than data on the distribution of energy in the cross-section of the beam. Seven bibliographic citations. V.I.R.

2/2

USSR

UDC 621.378.3; 535.89

MAK, A. A., Doctor of Sciences, MIT'KIN, V. M., SOMS, L. N., STEPANOV, A. I., Candidate of Sciences, SHCHAVELEV, O. S., Candidate of Sciences

"On Thermo-Optical Constants of Activated Glass"

Leningrad, Optiko-mekhanicheskaya promyshlennost', No. 9, Sep 71, pp 42-45

Abstract: A simple method is described for determining the thermo-optical constants of glass and the possibilities of obtaining glasses with small thermo-optical constants is discussed. It is noted that optical pumping of the active element of a laser is accompanied by heating of the laser and the formation of temperature gradients in the transverse cross section which cause stresses and double refraction, so that optical distortions arise in the element. Although many methods have been described for overcoming the harmful effects of distortions caused by these effects on the generation process, it is suggested that a more radical method would be the development of materials in which thermal distortions would be sufficient small. Three constants are discussed: W, the thermo-optical constant ordinarily applied in optics; P and Q, constants characterizing the distortion averaged for two polarizations, and the double refraction.

USSR

MAK, A. A., et al, Optiko-mekhanicheskaya promyshlennost', No. 9, Sep 71, pp 42-45

A table is given showing the values of P, Q and W for the following types of glass: KGSS3, KGSS7, LGS24-5, LGS28-2, LGS36, KGSS56 and KGSS1621. It is noted that for laser applications one should use a glass with zero or fairly small values of the constants W, P and Q. Studies showed that the thermo-optical constant W of the glass changes considerably with the composition of the glass. Its values can be much less than zero, 0 and negative. The constant P should be highly dependent on the composition of the glasses and its value can vary from -1 to +1 to the fifth power, so that the majority of compositions of industrial glasses and neodymium glasses should be characterized by values of P considerably less than zero. The constant Q depends on the composition of the glass to a considerably less degree than P. In the majority of silicate and phosphate glasses the constant Q is small and does not exceed $0.1 \cdot 10^{-5}$ deg^{-1}. It is concluded that it is possible in principle to obtain glasses with small values of the thermo-optical constants W, P and Q.

2/2

USSR UDC 621.818

KRAVTSOV, Yu. I., STEPANOV, A. I.

"A Magnetic Pulse-Duration Modulator for Controlling Transistorized Amplifiers"

Moscow, Otkrytiva, izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, 1970, No 36, Soviet Patent No 288036, class 21, filed 22 Apr 68, published 3 Dec 70, p 54

Translation: This Author's Certificate introduces a magnetic pulse-duration modulator for controlling transistorized amplifiers. The unit contains a choke-type magnetic amplifier and controlled transistors. As a distinguishing feature of the patent, in order to increase the sensitivity of the magnetic amplifier as well as to reduce the dimensions of its core, two tunnel diodes connected in series-opposition are placed in series with the magnetic amplifier windings. The common point of these diodes is connected to the emitters of the transistors, while the anodes of the diodes are connected to the bases of the transistors.

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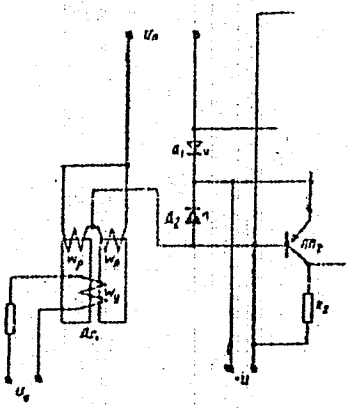
USSR

KRAVTSOV, Yu. I., STEPANOV, A. I., Otkrytiya, izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, 1970, No 36, Soviet Patent No 288036, class 21, filed 22 Apr 68, published 3 Dec 70, p 54



2/2

USSR UDC 536.46:533.6

GUREVICH, M. A., OZEROVA, G. Ye., STEPANOV, A. M.

"Calculation of Flame Propagation Rate in a Gaseous Suspension of Particles of Solid Fuel"

V sb. Goreniye i vzryv (Combustion and Explosion -- Collection of Works), Moscow, "Nauka", 1972, pp 199-203 (from RZh-Mekhanika, No 3, Mar 73, Abstract No 3B968)

Translation: The problem of the propagation of a plane flame front in a one-dimensional flow of a suspension of singly fractioned particles of solid fuel in a gas containing an oxidizer is considered. It is assumed that heating of the cold mixture due to heat release from the reaction occurs only in the molecular heat conductivity of the gas. This rate of displacement of the original gas suspension at which longitudinal temperature fields and reagent concentrations become possible is taken as the flame propagation rate. The flame propagation rate is calculated as a function of the initial parameters by numerical methods. Authors' abstract.

USSR UDC 536.46:533.6

GUREVICH, M. A., OZEROVA, G. Ye., STEPANOV, A. M.

"Calculation of the Combustion Rate of Metal Particles Considering Oxide Condensation"

V sb. Goreniye i vzryv (Combustion and Explosion -- Collection of Works), Moscow, "Nauka", 1972, pp 175-181 (from RZh-Mekhanika, No 3, Mar 73, Abstract No 3B967)

Translation: The rate of steam-phase combustion of a fixed metal particle is calculated. At any point (including particles at the surface and on the combustion surface) the partial pressure of the oxide vapors is considered equal to the pressure of the saturated vapor at that temperature, which is established at a given point. It is shown that in the presence of oxide condensation in the space surrounding the particle that loss of matter is also unavoidable with volumetric sources of heat. It is assumed that the condensed oxide collects on the surface, the radius of which is determined from the condition that the mass velocity of the gas is equal to zero on it. The calculated combustion rate constants for magnesium particles are compared with experimental data of other authors. Authors' abstract.

1/1

USSR

UDC:536.468

GUREVICH, M. A., OZEROVA, G. Ye., STEPANOV, A. M., Leningrad

"Heterogeneous Ignition of an Aluminum Particle in Oxygen and in Water Vapor"

Novosibirsk, Fizika Goreniya i Vzryva, Vol. 6, No. 3, Sep 70, pp. 326-335

Abstract: Experiments have determined that the limiting temperature of the medium for ignition of an aluminum particle first decreases with increasing particle size, then increases, approaching the fusion temperature of the oxide. This latter fact cannot be explained on the basis of the elementary theory of thermal explosion alone; some other factor, strongly influencing the process of heat and mass transfer between particle and medium must be considered. Analysis of experimental data indicates that this important factor is the oxide film covering the particle. Thus, two values of temperature of the medium are determined: the first from the limiting condition for autoignition of the particle, produced from the elementary theory of thermal explosion without considering the diffusion resistance of the oxide film, and the second on the basis of the condition of melting of the

1/2

USSR UDC:536.468

GUREVICH, M. A., OZEROVA, G. Ye., STEPANOV, A. M., Novosibirsk, Fizika Goreniya i Vzryva, Vol. 6, No. 3, Sep 70, pp. 326-335

oxide film. Keeping these in mind, the quasistable heat and mass transfer between a spherical aluminum particle and an oxygen-containing medium is studied. The kinetic constants are determined for the interaction of aluminum with the oxygen contained in the medium and with water vapor.

USSR UDC:536.468

GUREVICH, M. A., LYDKIN, V. M., STEPANOV, A. M., Leningrad

"Ignition and Combustion of a Gas Suspension of Magnesium Particles"

Novosibirsk, Fizika Goreniya i Vzryva, Vol. 6, No. 3, Sep 70, pp. 335-342

Abstract: The problem of ignition and combustion of a polyfractional gas suspension of magnesium particles is studied. The temperature and composition of the gas medium, as well as the concentration of particles of the same size are assumed identical throughout the entire volume of the gas suspension. The composition of the gas at each moment in time is considered to remain at the chemical equilibrium point, while the partial pressure of the gaseous oxide is equal to the saturated vapor pressure. The temperature of the condensed oxide is assumed equal to the temperature of the gas. Radiative heat exchange and heat and mass transfer with the external medium are not considered. Several versions of combustion of suspended magnesium particles in air are calculated. In all cases the initial distribution of particle masses by dimensions in considered linear. Results of the versions of calculation are presented.

1/1

USSR UDC 539.4.019.3

GUSEVA, I. P., NOVIKOV, S. N., and STEPANOV, A. P., Sverdlovsk

"Effect of Heat Treatment on the Strength of Al-B-So Glass Fiber"

Moscow, Fizika i Khimiya Obrabotki Materialov, No 4, Jul-Aug 73, pp 110-117

Abstract: The heat treatment of an Al-B-Si glass fiber was investigated for the effect on strength in a temperature range from 50 to 500°C. From 50 to 200°C the glass fiber strength remains constant (about 255 kG/mm^2) after which the strength drops off with the amount of strength loss a function of the hydrofluoric acid concentration (at 500°C, strength in 0.5% HF = 145 kG/mm^2; 0.2% HF, 195 kG/mm^2; and 0.02%, 220 kg/mm^2). In distilled wate the glass fiber strength was 345 kG/mm^2 throughout the entire temperature range. It was determined that surface cracks form on the glass fiber in the 200-300°C interval and are a direct cause of strength loss. Strength loss is not attrubutable to high temperatures but is a result of the interaction of coordinate-unsaturated centers on the glass surface with the surrounding atmosphere (oxygen from the air) and the proposed mechanism of strength lowering during heat treatment of Al-B-Si and other silicate fibers is the chemisorption of oxygen by the coordination-unsaturated surface centers. Four figures, sixteen bibliographic references.
1/1

(4)

JPRS 59393

29 June 1973

STEPANOV, A.P.

APPLICATION OF DYNAMIC NUCLEAR POLARIZATION TO INCREASE THE SENSITIVITY AND SPEED OF NUCLEAR PRECESSION MAGNETOMETERS

[Article by G. V. Skrotskiy, A. P. Stepanov, V. M. Srotskiy, and A. I. Filatov; Leningrad, Geofizicheskaya Apparatura, Russian, No 42, 1970, pp 10-57]

Despite the successful development of quantum optical magnetometers for different purposes, nuclear magnetometers continue to firmly hold their own for measurements on the earth, in outer space, and in the sea and are also used extensively for the solution of many geological problems [Kotshteyn and Tsirel', 1963].

Nuclear precession magnetometers (NPM) have a number of essential advantages, not only in comparison with induction and ferroprobe magnetometers, but also with respect to optical magnetometers. Nuclear precession magnetometers ensure high accuracy in absolute and relative measurements, do not require special temperature stabilization of the signal, do not have drift in the metering level of the signal, and their readings are practically independent of the orientation of the device's pickup in space relative to the direction of the field being measured. In addition, NPM are reliable and operationally stable, are small and light, and are convenient to use [Waters and Phillips, 1956; Ryzhkov and Skrotskiy, 1961; Pomerantsev, Ryzhkov, and Skrotskiy, 1967].

The standard operating conditions of NPM are ensured by prior magnetization or polarization of the actuating material of the pickup. Polarization is usually realized by passing a direct current through the coil of the pickup. This current creates a rather strong constant magnetic field, which is called the polarizing field, in the volume of the actuating material. Under the influence of this field, the actuating material is magnetized after a certain time. After nonadiabatic switching off of the polarizing field, free precession of the nuclear magnetic moments of the actuating material that are oriented by this field develops about the direction of the measured magnetic field. The precessing moments induce an EMF in the coil

that created the magnetizing field or in another, separate coil. The frequency of this EMF is associated in a simple manner with the magnitude of the measured external field.

The advantage of the use of this method of polarization in NPM, which was first proposed by Packard and Varian in 1953, is explained not so much by the exceptional simplicity of its realization as by the high reliability of the operation of the scheme as a whole. The scheme of the device includes a pickup containing the actuating material, an amplifier of the free precession signals, a measuring-recording device, a source of polarizing voltage, and a commutating device that ensures periodic switching of the pickup from the polarizing voltage source to the input of the precession signal amplifier.

However, in addition to the enumerated virtues, NPM with polarization of the actuating material by a strong constant magnetic field have a number of deficiencies. The major deficiency, which is due to the method used to create polarization of the actuating material, consists in the unavoidable cyclic character of the operation of the magnetometer. As a result, a pause, during which the field is not measured, develops during time intervals that are of the order of or greater than the spin-lattice relaxation time. In the actuating materials that are currently being used, the time expended in polarization several times exceeds the measurement time and amounts to one to several seconds.

A certain time, which is greater, the more accurately the frequency must be measured, is needed for the measurement of the precession frequency. The method of free precession therefore makes it possible to measure the magnetic field strength, averaged for the measurement time, and for this reason does not make it possible to detect changes in the magnetic field that occur during the measurement. An increase in the rate of operation of the magnetometers inevitably results in a loss in the accuracy of the measurements. These peculiarities of NPM are not always acceptable for practical purposes [Rotshteyn and Tsirel', 1963; Amosov, Rotshteyn, and Tsirel', 1962].

The low magnitude of the nuclear precession signal should also be included among the inadequacies of nuclear precession magnetometers. In order to ensure the necessary signal-noise ratio and to obtain high sensitivity (and, consequently, accuracy in the measurements), it is necessary to use an extremely large volume of actuating material and a strong polarizing field. However, even these measures are not always effective. When the volume of the pickup is increased, the nonuniformity of the measured field begins to have a stronger effect, and this leads to rapid attenuation of the precession signal and to an increase in the error in the measurements. However, the polarizing field strength can be increased only up to definite values. Substantial technical difficulties associated with the necessity for ensuring the nonadiabatic switching off of this field and also with the thermal operation of the pickup develop at strong (above 500 Oe) fields. In

UDC 539.1

USSR

DOVGOPOL, S. P., IZYUMOVA, T. G., KONONENKO, A. YE., STEPANOV, A. P.

"Toward a Theory of the Dynamic Polarization of Nuclei in Concentrated Solutions of Free Radicals"

Tr. Ural'skogo politekhn. in-ta (Works of Ural'sk Polytechnical Institute), 1969, Collection 172, pp 14-18 (from RZh-Fizika, No 3, Mar 70, Abstract No 3V112)

Translation: Dynamic polarization of nuclei in solutions of free radicals (concentration up to 10^{20} cm^{-3}), where the solvent contains nuclei of two types, I_1 and I_2, is considered. It is assumed in the calculation that each electron spin interacts only with one nucleus of type I_1 (in a dipole-dipole and scalar fashion) and with one nucleus of type I_2 (in only a dipole-dipole fashion). Results obtained in the Abraham model approximation (modulation of scalar interaction by random chemical exchange) and the Hubbard model (modulation of translational diffusion of spins due to dependence of the interaction constant on distance between spins) are compared. Formulas are obtained for the relaxation time of a multispin system in the presence of independent spin relaxation mechanisms. These formulas are necessary to calculate the dynamic polarization coefficient. The basic consequences associated with considering exchange interaction are that the dynamic polarization coefficient ceases to be a linear

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USSR

DOVGOPOL, S. P., et al, Tr. Ural'skogo politekhn. in-ta, 1969, Collection 172, pp 14-18 (from Rzh-Fizika, No 3, Mar 70, Abstract No 3V112)

function of the inverse concentration for sufficiently strong exchange interaction. The "compensation temperature" for which contributions of dipole-dipole and scalar interactions which are different in sign become equal in magnitude (in observations on nuclei of type I_1) is determined. V. P. Parfenova.

Acc. Nr: AP0049169 Abstracting Service: CHEMICAL ABST. 5-70 Ref. Code: 4R0080

104190q Mechanism of the reaction of organometallic compounds on the surface of activated carbon. Zemskov, I. F.; Stepanov, A. S. (Kalinin. Politekh. Inst., Kalinin, USSR). *Zh. Prikl. Khim. (Leningrad)* 1970, 43(1), 189–92 (Russ). Some reactions of the title compds., including $PbEt_4$ (I), $SnEt_4$ (II), $HgEt_2$ (III), and EtHgCl (IV), adsorbed on activated carbon (V) were investigated. When air–I or II mixts. passed through columns of V, I and II reacted at the surface with O from the mixt. and were decompd. in the process. This increased the adsorbtive capacity of V towards I and II. Treatment of V satd. with I with Cl or ozone accelerates the decompn. of adsorbed I. III and IV do not react with atm. O on the surface of V. When adsorption of I–IV is made in the presence of ozone, only the content of adsorbed I is increased, due to its oxidizability.

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STEPANOV, A.V.

JPRS 59008
6-73

III-5. CHARACTERISTIC FEATURES OF THE GROWTH OF SINGLE GERMANIUM CRYSTALS

[Article by N. I. Antonov, G. V. Sachkov, D. I. Levinzon, A. V. Stepanov, Physicotechnical Institute imeni A. F. Ioffe of the USSR Academy of Sciences, Leningrad; Novosibirsk, III Simpozium po Protsessam Rosta i Sinteza Poluprovodnikovykh Kristallov i Plenok, Russian, 12-17 June, 1972, p 32]

When growing shaped single crystals by the Stepanov procedure, a close relation is observed between the shape of the melt column, the thermal field in the crystal and the melt column and the crystallographic orientation of the crystal. As the practice of growing shaped single crystals demonstrates, the configuration of the seed crystal is not the shape forming factor. The final form of the crystal is determined by the outline of the shape forming hole and the position of the crystallization front. However, in the initial growth stage, the shape of the seed crystal is realized both for shaping the melt column and for the thermal fluxes through the crystal-melt interface.

The presence of octahedral planes capable of severe faceting changes the shape of the crystallization front and the shape of the melt column. It turns out that the structural and electrical properties of germanium single crystals depend to a strong degree on the above indicated crystallization parameters.

When growing monocrystalline rods of germanium from 2 to 10 mm in diameter and with orientations of <100>, <110>, <111>, <211>, <221>, <321>, the degree of faceting of the single crystals varies from 90 to 5 percent. Controlling the crystallization parameters [the thermal field of the melt column and the crystal, the shape of the melt column], it was possible to obtain monocrystalline rods of germanium with a class 12 surface finish. The dislocation density in them was from 1-10 to 10^3 cm^{-2}.

The distribution of the alloying admixtures in shaped single crystals in the general case is subject to the same laws as are observed when growing single crystals from a melt. However, when growing sharply alloyed single crystals by the Stepanov procedure, there is no long-period banding or short-period stable banding. The presence of the embossing device permits a significant decrease in the intensity of the growth bands.

USSR

UDC 543.545:546.65:539.173.8

GVOZDEV, B. A., GRITCHENKO, Z. G., MAKAROVA, T. P., OGANESYAN, Yu. Ts., and STEPANOV, A. V.

"Use of the Electromigration Method in Studying the Yields of Certain Rare-Earth Elements in the Reactions U(^{12}C, f), U(^{22}Ne, f) and U(^{40}Ar, f)"

Leningrad, Radiokhimiya, Vol XIII, No 3, 1971, pp 421-429

Abstract: Fission reactions of the nuclei of heavy ions are important 1) in the theoretical treatment of the fission of strongly excited nuclei, and 2) in the practical synthesis of new elements and isotopes.

A thick target (~20 mg/cm^2 U_3O_8) was irradiated for several hours with the inner beam of the 300 cm cyclotron of the Laboratory of Nuclear Physics, United Institute of Nuclear Research, with ^{12}C, ^{22}Ne or ^{40}Ar (energies of ~110, 190 and 350 Mev, respectively); after which the irradiated target was dissolved in HNO_3, and addition of a carrier of ~50-100 µg La^{3+}, the La and rare earth fluorides were precipitated. The latter was transformed into hydroxides in 7.5 N HCl, the resulting solution was passed through a column filled with the anion exchanger Dauex-1 in Cl^--form to remove tetravalent

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USSR

GVOZDEV, B. A., et al., Radiokhimiya, Vol XIII, No 3, 1971, pp 421-429

elements captured by LaF_3. The filtrate, containing all the rare earths and the tetravelent actinides, was heated to dryness, then separated by the electromigration method, with use of ordinary electrophoretic equipment. Relative yields of La, Ce, Pr, Nd, Pm, Sm, Eu and Gd isotopes, resulting from uranium fission by C, Ne and Ar ions, were measured. Tabular data accompany the paper.

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1/2 027 UNCLASSIFIED PROCESSING DATE--13NOV70

TITLE--QUALITY AND EFFECTIVENESS OF CONTROLLING THE TEMPERATURE OF THE FLUIDIZED BED ROASTING OF MOLYBDENITE CONCENTRATES -U-

AUTHOR-(03)-GOLANT, A.I., KORNEYEVA, S.G., STEPANOV, A.V.

COUNTRY OF INFO--USSR

SOURCE--TSVET. METAL. 1970, 43(3), 45-7

DATE PUBLISHED--------70

SUBJECT AREAS--MECH., IND., CIVIL AND MARINE ENGR, EARTH SCIENCES AND OCEANOGRAPHY, MATERIALS

TOPIC TAGS--THERMAL EFFECT, ROASTING FURNACE, FLUIDIZED BED, AUTOMATIC CONTROL SYSTEM, MOLYBDENUM

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--3004/1903 STEP NO--UR/0136/70/043/003/0045/0047

CIRC ACCESSION NO--AP0132165

UNCLASSIFIED

2/2 027 UNCLASSIFIED PROCESSING DATE--13NOV70

CIRC ACCESSION NO--AP0132165

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A STUDY WAS MADE TO DET. THE DECREASE IN LOSS DUE TO INCREASE IN TEMP. BY MEANS OF CHANGING CONTROL, ESTG. THE QUALITY OF AN AUTOMATED SYSTEM OF CONTROL AND ESTG. THE QUALITY OF AN AUTOMATED SYSTEM UNDER NEW CONDITIONS. FOR DET. THE POSSIBILITY OF DEVELOPING A TEMP. CONTROL SYSTEM AND CHANGING THE QUALITY OF TECHNOL. PROCESSES, THE ROASTING TEMP. WAS VARIED IN 20DEGREES INTERVALS FROM 555 TO 575DEGREES. THE STUDY WAS MADE AT VARIOUS TEMPS. DURING 8 HR, THE TEMP. AND AMT. OF THE CHARGE MATERIAL WAS RECORDED THROUGH EACH 5 MIN. A TEST OF THE ASH AND FLAME WAS TAKEN AT THE BEGINNING AND THE END OF EACH RECORDED TEMP. CHANGE. THE CONCN. OF S IN THE DUST DECREASED BY 0.23PERCENT; I.E., THE TEMP. CHANGE AFFECTS THE QUALITY OF THE DUST COLLECTED DURING PURIFICATION OF THE EXITING GASES. DECREASING SULFIDES IN THE ASH BY 0.4PERCENT BY LEACHING WITH AMMONIA INCREASES THE RECOVERY OF MO IN THE SOLN. AND CORRESPONDINGLY LOWERS ITS LOSS. THIS LOSS IN OBSD. CASES WAS 670 KG MO PER YEAR. DECREASING THE CONCN. OF SULFIDES IN THE FLAME BY 2.9PERCENT LOWER THE LOSS OF MO BY 350 KG PER YEAR.

UNCLASSIFIED

Converters

Computer

USSR

UDC: 621.394.676

STEPANOV, A. V., PARAMONOV, G. N., GOLOMOZYUK, V. A., "Arsenal" Plant imeni V. I. Lenin

"A Device for Converting Binary Code to Binary-Decimal-Sexagesimal Code"

Moscow, Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnyye Znaki, No 31, Nov 71, Author's Certificate No 318158, Division H, filed 29 Sep 69, published 19 Oct 71, p 211

Translation: This Author's Certificate introduces a device for converting binary code to binary-decimal-sexagesimal code. The device contains a first binary counter, a pulse generator and a binary-decimal-sexagesimal counter. As a distinguishing feature of the patent, conversion accuracy is improved by using a series-parallel summation device which contains a second binary counter and a pulse distributer whose input is connected to the generator output. The input of the generator is connected to the output of the first binary counter, and the distributer outputs are connected in parallel to the inputs of the second counter, and in series to the input of the binary-decimal-sexagesimal counter.

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USSR

UDC 681.142.334(049.1)

STEPANOV, A. YE., PASHKO, D. I., SHAYKEVICH, V. D., and POCHTMAN, YU. M.

Kvazianalogovyye Metody Modelirovaniya Krayevykh Zadach Dlya Differentsial'nykh Uravneniy v Chastnykh Proizvodnykh (Quasi-Analog Methods of Boundary Value Problem Simulation for Partial Differential Equations, Kiev, "Naukova Dumka," 1973, 174 pp

Abstract: The mooograph contains original results of research in the area of developing and using specialized quasi-analog simulation machines to solve applied problems of mathematical physics described by partial differential equations. In particular, methods of simulating two-dimensional problems in the applied theory of elasticity and non-equilibrium problems of thermal conductivity and underground hydraulics are described, as well as the principles of constructing specialized quasi-analog, mathematical machines for solving these equations.

The book is intended for scientific workers, engineers, graduate students, and students interested in electronic simulation and its theory.

1/6

USSR

STEPANOV, A. YE., et al., Quasi-Analog Methods of Boundary Value Problem Simulation for Partial Differential Equations, Kiev, "Naukova Dumka," 1973, 174 pp

CONTENTS

2/6

USSR

STEPANOV, A. YE., et al., Quasi-Analog Methods of Boundary Value Problem Simulation for Partial Differential Equations, Kiev, "Naukova Dumka," 1973,174 pp

3/6

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STEPANOV, A. YE., et al., Quasi-Analog Methods of Boundary Value Problem Simulation for Partial Differential Equations, Kiev, "Naukova Dumka," 1973, 174 pp

4/6

USSR

STEPANOV, A. YE., et al., Quasi-Analog Methods of Boundary Value Problem Simulation for Partial Differential Equations, Kiev, "Naukova Dumka," 1973, 174 pp

5/6

USSR

STEPANOV, A. YE., et al., Quasi-Analog Methods of Boundary Value Problem Simulation for Partial Differential Equations, Kiev,"Naukova Dumka," 1973, 174 pp

6/6

USSR

UDC 681.332.65

KRAMSKOY, V. V., PASHKO, D. I., STEPANOV, A. Ye., Institute of Cybernetics, Academy of Sciences, Ukrainian SSR

"Device for Solution of Differential Equations"

USSR Author's Certificate Number 323782, 23 March 1970, Opkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnyye Znaki, No 1, January (a) 1972, pp 190-191

Translation: The authors present a device for solution of partial differential equations containing a one-dimensional block of capacitor memories, divided into groups, which are connected, by means of switches activated by the control device, to feedback circuits of dc amplifiers, a switching matrix, conductors simulating the coefficients of the finite-difference operator, and sources of current to simulate the right side of the equation and boundary conditions. It has the special feature that, in order to expand the range of problems solved, it contains a multidimensional block of capacitor memories connected through switches in parallel with the dc amplifiers, the inputs of the amplifiers being connected through other switches to the outputs of the dc amplifiers of the one-dimensional block of capacitors, and also through the switching matrix to the code-controlled conductors to simulate the coefficients with the derivatives in their spatial coordinates and time, a

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KRAMSKOY, V. V., et al., USSR Author's Certificate Number 323782, 23 March 1970, Opkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnyye Znaki, No 1, January (a) 1972, pp 190-191

code-controlled current supply to simulate the right side of the equation and boundary conditions, and also an additional direct current amplifier to realize negative coefficients of the finite-difference operator.

2/2

USSR

UDC 534.232.46-8

GULYAYEV, Yu.V., IVANOV, S.N., MANSFEL'D, G.D., PROKLOV, V.V., STANKOVSKIY, B.A., STEPANOV, S.G. [In-t radiotekhn. i radioelektron. AN SSSR--Institute Of Radio Engineering And Radio Electronics, AS, USSR]

"Ultrasonic High-Frequency Transducer"

USSR Author's Certificate No 250554, Filed 5 July 67, Published 16 Jan 70 (From RZh--Elektronika i yeye primeneniye, No 8, August 1970, Abstract No 8A347P)

Translation: An ultrasonic high-frequency transducer patented for use in ultrasonic delay lines and ultrasonic amplifiers contains a resonator and a piezosemiconductor crystal involving a layer stripped of charge carriers. With the object of obtaining ultrasonic oscillations of ultra-high frequency, the piezosemiconductor crystal is connected with the central core of the resonator by a thin dielectric layer (e.g., mica) and a controlled voltage source is connected to the central core of the resonator and to the crystal. 1 ill. L.K.

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USSR

UDC 547.341.3:543.422.3'6

STEPANOV, B. I., CHEKUNINA, L. I., and BOKANOV, A. I., Moscow Chemical Technological Institute imeni D. I. Mendeleyev

"Synthesis and Investigation of p-Nitrophenylethynylphosphines and Phosphine Oxides"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 12, Dec 73, pp 2648-2654

Abstract: A synthetic method has been developed for arylbis(p-nitrophenylethynyl)phosphines based on the reaction of aryldichlorophosphines with copper p-nitrophenylacetylenide. Introduction of a dimethylamino group into the aromatic ring of the phenylbis(p-nitrophenylethynyl)phosphoric compounds results in an appearance of new bands in electronic spectra which are due to the electronic transfer with delocalization of the electron through the phosphorus atom.

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USSR

UDC 541.67:547.241

ROMM, I. P., ROZANEL'SKAYA, N. A., GUR'YANOVA, Ye. N., BOKANOV, A. I., and STEPANOV, B. I., Scientific Physical-Chemical Research Institute imeni L. Ya. Karpov and Moscow Chemical Technological Institute imeni D. I. Mendeleyev

"Dipole Moments of Methyl Substituted Triphenylphosphines"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 7, Jul 73, pp 1650-1651

Abstract: Dipole moments of tri-, hexa-, and nonamethyl substituted triphenylphosphines have been determined. All the results except for the nonamethyl homolog agreed with literature data. The trimesitylphosphine dipole was lower by 0.5 D than that of the triphenylphosphine. This indicates considerable change in the geometry of triphenylphosphine upon introduction of two methyl groups into the orthopositions of each ring.

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UDC 543.422.27:541.515:547.1'118

USSR

SOLODOVNIKOV, S. P., BOKANOV, A. I., CHEKUNINA, L. I., and STEPANOV, B. I., Institute of Elemental Organic Compounds, Academy of Sciences SSSR and Moscow Chemical Technology Institute imeni D. I. Mendeleyeva

"ESR Spectra of the Anion Radicals of Phenyl-bis-(p-nitrophenylethynyl) phosphine and Phosphenoxides"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, 1, Jan 73, pp 205-206

Abstract: The ultrafine structures of ESR spectra of the anion radicals of $(p\text{-}NO_2C_6H_4C{\equiv}C\text{-})_2\text{-}P(C_6H_4X\text{-}p)$ (I), for X = H, Cl, $N(CH_3)_2$ and $(p\text{-}NO_2C_6H_4C{\equiv}C\text{-})_2P(O)C_6H_5$ (II). The electrons appear to be localized only in the p-nitrophenylacetyl fragment of (I) for X = H. The substitution of $N(CH_3)_2$ for H results in a small increase in the splitting of the P relative to H (and also to X = Cl). The secondary spectra of (I) and (II) have the same form as those of the anions. The polarographic reduction of I for X = H and II did not show a σ-system for the nitrophenylethynyl group through the P atom. Measurement of the electrode potential of the first half wave relative to a saturated calomel electrode in acetonitrile gave the following values for $-E_{1/2}$ in volts: $C_6H_5NO_2$, 1.10; p-HC $C_6H_4NO_2$, 0.99; (I) for X = H, 0.94; and (II), 0.94.

USSR UDC 535.33.41 : 535.45 : 535.37

STEPANOV, B. I.

"Solvent Effect on Electron-Vibrational Spectra of Complex Molecules"

Minsk, Zhurnal Prikladnoy Spektroskopii, Vol 17, No 1, Jul 72, pp 92-100

Abstract: The article gives a quantum mechanical analysis of the formation of the absorption and luminescence bands of complex molecules with allowance for the effect of the solvent. The calculations take into consideration the fact that in absorption and light-emission events changes in the electron vibrational energy of a complex molecule are accompanied by changes in the energy of the orientation motion of the solvent molecules. Adiabatic approximation is used twice. First it is considered that the rates at which the nuclei of the molecule move are considerably less than the rotational velocities of the electrons, and then in the second stage that the rotational velocities of the solvent molecules are much less than the velocities of the processes taking place inside the complex molecule. Expressions are obtained to explain the temperature dependence of the luminescence band shift and other experimental facts.

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USSR UDC 547.538.2'341.3:543.422.62'4'6

CHEKUNINA, L. I., BOKANOV, A. I., and STEPANOV, B. I., Moscow Institute of Chemical Technology imeni D. I. Mendeleyev

"Spectral Properties of Phenylethynylphosphines and Phosphine Oxides"

Leningrad, Zhurnal Obshchey Khimii, Vol 42 (104), No 5, May 72, pp 995-999

Abstract: The authors' study revealed that phosphorus blocks the conjugated π systems of phenylethynyl groups in tertiary phenyl(phenylethinyl)phosphines and phosphine oxides. The spectral indications of conjugation in the oxide of p-dimethylaminophenyl-bis(phenylethynyl)phosphine are, probably, a result of the interaction of the π* orbitals of the triple bond and the p-dimethylaminophenyl through the d orbitals of phosphorus. The article contains two illustrations of ultraviolet spectra and two tables. One table gives the physical properties of phosphorus-containing derivatives of phenylacetylene, and the other describes the dependence of the properties of the main band of dimethylanilines $p\text{-}XC_6H_4N(CH_3)_2$ on the nature of the substituent X.

USSR

UDC 547.261'18'17'13:543.422.25

ZELENEVA, T. P., ANTONOV, I. V., and STEPANOV, B. I., Moscow Chemical-Technological Institute Imeni D. I. Mendeleyev

"PMR Spectra of Alkoxy- and Arylalkoxysubstituted Cyclotriphosphazatrienes"

Leningrad, Zhurnal Obshchey Khimii, Vol 42 (105), No 5, May 73, pp 1007-1010

Abstract: Reacting hexachlorocyclotriphosphazatriene with propyl, butyl, benzyl and phenethyl alcohols gave cyclophosphazatriene acid esters with the general formula $N_3P_3(Cl_{6-n}OR)_n$ where n = 1,2,3,6 for R = Bu, and n = 3,6 for R = Pr, CH_2Ph, and CH_2CH_2Ph. These products were studied by PMR spectroscopy. It was shown that these compounds exhibit a virtual remote spin-spin split. It was possible to establish geminal and nongeminal structures of the substituted phosphazatrienes by means of PMR spectroscopy.

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UDC 547.558.1+543.422

USSR

EDEL'MAN, T. G., STEPANOV, B. I., Moscow Institute of Chemical Technology imeni D. I. Mendeleyev

"Synthesis and Properties of Arylimines of p-Nitrophenyldiphenylphosphine"

Leningrad, Zhurnal Obshchey Khimii, Vol 42(104), No 7, Jul 72, 1477-1480

Abstract: Arylimines of p-nitrophenyldiphenylphosphine (I) were synthesized with general formula $p\text{-}O_2NC_6H_4(C_6H_5)_2P{=}NC_6H_4X\text{-}p'$ where X = $N(CH_3)_2$ (II), H (III), and NO_2 (IV). The initial phosphine (I) was synthesized by a previously described method (G. P. Schiemenz, Chem. Ber., Vol 99, p 514, 1966), and phosphazo compounds (II-IV) were obtained by reacting (I) with aromatic azides. Analysis of the electron absorption spectra of the resultant compounds showed that adding a nitro group to the phenyl ring bound to the phosphorus atom increases the conductivity of the P=N bond. New absorption bands then show up caused by electron transitions in the system comprising the entire molecule of the phosphazo compound.

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Radar

USSR

VASIN, VLADIMIR VASIL'YEVICH, VLASOV, OLEG VALERIANOVICH, GRIGORIN-RYABOV, VIKTOR VALERIANOVICH, DUDNIK, PAVEL IVANOVICH DUDNIK, and STEPANOV, BORIS MIKHAYLOVICH

"Radar Equipment (Theory and Principles of Construction)" [Radiolokatsionnyye Ustroystva (Teoriya i Printsipy Postroyeniya)], Moscow, Izd-vo "Sovetskoye Radio," 1970, 18,500 copies, 680 pages

Abstract: The book presents radar principles, co-ordinate measurement methods, and scanning. Problems of radar signal detection, the accuracy in measuring their parameters, and solutions are examined. The principles for constructing radar equipment of different types are given, as well as their main characteristics are analyzed.

In conclusion, considerations for construction of radar systems, which are intended for solving concrete problems (aerial and marine target detection, radar observation of ground objects, etc.) are presented.

The book is intended for students of higher institutes of learning and may serve as a manual for specialists working in the field of radar. The book has two tables, 343 figures, and 69 citations.

1/1

USSR

VASIN, VLADIMIR VASIL'YEVICH, et al., "Radar Equipment (Theory and Principles of Construction)" [Radiolokatsionnyye Ustroystva (Teoriya i Printsipy Postroyeniya)], Moscow, Izd-vo "Sovetskoye Radio," 1970, 18,500 copies, 680 pages

The chapter headings are as follows:

USSR

VASIN, VLADIMIR VASIL'YEVICH, et al., "Radar Equipment (Theory and Principles of Construction)" [Radiolokatsionnyye Ustroystva (Teoriya i Printsipy Postroyeniya)], Moscow, Izd-vo "Sovetskoye Radio," 1970, 18,500 copies, 680 pages

3/4

USSR

VASIN, VLADIMIR VASIL'YEVICH, et al., "Radar Equipment (Theory and Principles of Construction)" [Radiolokatsionnyye Ustroystva (Teoriya i Printsipy Postroyeniya)], Moscow, Izd-vo "Sovetskoye Radio," 1970, 18,500 copies, 680 pages

4/4

USSR

UDC 621.373.826

AKIMOV, YU. A., BUROV, A. A., GOVORKOV, O. I., KRYUKOV, I. V., RODICHENKO, G. V., STEPANOV, B. M.

"KGP-1M Semiconductor Quantum Generator with Electron Excitation"

V sb. Ispol'z. optich. kvant. generatorov v sovrem. tekhn. i med. Ch. 2-3 (Utilization of Lasers in Modern Engineering and Medicine. Parts 2-3--collection of works), Leningrad, 1971, pp 15-20 (from RZh-Radiotekhnika, No 1, 1972, Abstract No 1D376)

Translation: The KGP-1M laser designed for generation of a series of radiation pulses with the interferometric and shadow methods of investigating the optical inhomogeneities is described. The basic characteristics of the laser are as follows: The radiation pulse duration is 10 nanoseconds to 1 microsecond, the repetition rate is 100 hertz to 1 hertz, the radiation power is 100 watts to 1 watt. When operating in the pulse mode, the packet repetition rate is 100 hertz, the number of pulses per packet is 20-30, the pulse repetition rate in the packet is 100 megahertz to 1 gigahertz, the duration of the light pulses is 1-0.1 nanoseconds, and the radiation power per pulse is 100 watts. As the working medium of the semiconductor target, n-type gallium arsenide alloyed with Te is used with an impurity concentration of $1\text{-}3\cdot10^{18}$ cm^{-3}. At the temperature of liquid nitrogen, λ = 0.884-0.89 microns. There are 4 illustrations and a 3-entry bibliography.

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USSR

UDC 538.573.001.5

KLYUKIN, L.M., MAKSIMOV, V.I., STEPANOV, B.M., FABRIKOV, V.A., SHEVCHUK, E.N.

"Registration Of The Structure Of Microwave Radiation On Magnetic Film"

Radiotekhnika i elektronika, Vol XVII, No 5, May 72, pp 1114-1116

Abstract: The thermal method of recording radiation on thin magnetic film with strip domains described previously in two papers by L.M. Klyukin and others was used for registration of the structure of microwave radiation. The scheme of the device used for recording microwave radiation on magnetic film and a block diagram of the experimental equipment used for registration are shown and described. The authors thank V.P. Kuznetsov for assistance in conducting the experiment. 3 fig. 2 ref. Received by editors, 7 June 1971.

1/1

USSR

UDC 539.194

CHURAKOV, V. V., STEPANOV, B. I.

"Effect of Resonance Exchange Between the Levels 10°0 and 02°0 on the Amplification Coefficient of a Weak Signal in a CO_2 Amplifier"

Minsk, Zhurnal Prikladnoy Spektroskopii, No. 1, Jan 72, pp 49-53

Abstract: The amplification coefficient is calculated in a CO_2 amplifier considering resonance exchange between the levels 10°0 and 02°0. It is noted that an expression was derived for the amplification coefficient of a weak signal in the rotation-vibration band. It was assumed in the calculation that the rate of rotational relaxation was considerably greater than the rate of vibration relaxation, and the results obtained agree with experimental data; however, direct application of these results to CO_2 lasers is complicated since there is exchange between the 10°0 and 02°0 vibration levels in the CO_2 molecule. If the rate of transition from the 10°0 level to the 02°0 level and the reverse is sufficiently great, the initial assumption is not satisfied; it is known from the literature that the rate of rotational relaxation in lasers is of the order of 10^7 $sec^{-1} \cdot torr^{-1}$ and it was found that the lower limit of the rate of energy

USSR

CHURAKOV, V. V., STEPANOV, B. I., Zhurnal Prikladnoy Spektroskopii, No. 1, Jan 72, pp 49-53

transfer from the 10°0 level to the 02°0 level was 10^6 $sec^{-1} \cdot torr^{-1}$. It was for this reason that resonance exchange was considered for a more exact determination of the rate of rotational relaxation from the measured amplification coefficient of a weak signal in the experiment. It is stated that the data obtained can be used to interpret experimental results and evaluate the rates of rotational relaxation and resonance exchange on the basis of these results.

2/2

USSR

UDC 547.538.2'341.3:543.257.1

CHEKUNINA, L. I., BOKANOV, A. I., STEPANOV, B. I.

"Electrophilic Nature of Bis(arylethinyl)phosphonous and bis(arylethinyl)phosphinyl Radicals"

Leningrad, Zhurnal Obshchey Khimii, Vol XLII (CIV), No 1, 1972, pp 110-112

Abstract: In a previous study of the alkalinity of dimethylanilines in nitromethane [B. A. Korolev, et al., ZhOKh, No 39, 1161, 1969], it was demonstrated that their pK_a (CH_3NO_2) are correlated by the nucleophilic constants σ^-, however, the accuracy of the correlation equation was low as a result of an inadequate set of substances: 3 compounds, r 0.986, s 0.40. In this paper, dimethylanilines are used as the standard substances the alkalinity of which is described by the equation (r 0.990, s 0.23):

$$pK_a(CH_3NO_2) = 10.77 - (3.62 \pm 0.13)\sigma^-$$

The n-dimethylaminophenyl-bis(arylethinyl)phosphines and phosphinoxides were protonized with respect to nitrogen. The σ^- constants were determined for four organophosphorus substitutions with arylethinyl radicals on the phosphorus. In the investigated bis(arylethinyl)phosphines, the unshared phosphorus electrons

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USSR

CHEKUNINA, L. I., et al., Zhurnal Obshchey Khimii, Vol XLII (CIV), No 1, 1972, pp 110-112

do not participate in the conjugation transfer. The ultraviolet spectra of the investigated substances are presented.

USSR UDC: 547.44:547.415.5

TAKSIDI, V. KH., and STEPANOV, B. I., Moscow Chemical-Technology Institute Imeni D. I. Mendeleyev

"Aldehyde Reactions With Tertiary Amines in Presence of Hexachlorocyclophosphazatriene"

Leningrad, Zhurnal Organicheskoy Khimii, Vol 6, No 4, Apr 70, pp 815-818

Abstract: Hexachlorocyclophosphazatriene /HCCPT/ appears to be an energetic condensing agent in reactions of aldehydes and tertiary amines, leading to the formation of di- and triarylmethyl derivatives. For example, HCCPT reacted with pyridine, dialkylanilines, benzaldehyde and its sulfoacids, with furfurols, acetaldehyde and formaldehyde at 10-18° yields after 50-60 hrs colored products which are soluble in alcohol, stable under normal conditions, but easily decompose in aqueous NaOH solution. For example, treatment of the adduct of HCCPT, pyridine and benzaldehyde with NaOH regenerates some pyridine, benzaldehyde, and yields a new orange colored compound, which the authors have shown to be the benzylidene derivative of 1-aminopentadiene-1,3-al-5, m.p. about 40°. It is soluble in alcohol, benzene, and ether, insoluble in petroleum ether.
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UNCLASSIFIED PROCESSING DATE--20NOV70

1/2 026

TITLE--SYNTHESIS AND PROPERTIES OF TERTIARY MESITYLETHYL PHOSPHINES -U-

AUTHOR-(05)-ILINA, L.K., KARAVANOV, K.V., KARPOVA, YE.N., BOKANOV, A.I., STEPANOV, B.I.

COUNTRY OF INFO--USSR

SOURCE--ZH. OBSHCH. KHIM. 1970, 40(3), 581-4

DATE PUBLISHED--------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--ORGANIC SYNTHESIS, ORGANIC PHOSPHORUS COMPOUND, ORGANOMAGNESIUM COMPOUND, OXIDATION, ORGANIC OXIDE, BENZENE DERIVATIVE, ISOTOPE, ORGANIC NITRO COMPOUND, IMINE

CONTROL MARKING--NO RESTRICTIONS

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PROXY REEL/FRAME--3002/1069

CIRC ACCESSION NO--AP0128496

UNCLASSIFIED

2/2 026 UNCLASSIFIED

CIRC ACCESSION NO--AP0128496 PROCESSING DATE--20NOV70

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. MESITYLMAGNESIUM BROMIDE FROM 2.4 G MG AND 12.5 G ET SUB2 PCL MIXED AT MINUS 10DEGREES IN THF AND REFLUXED 0.5 HR GAVE 59PERCENT MESITYLDIETHYLPHOSPHINE (I), B SUB1 100-2DEGREES, D PRIME20 0.959, N PRIME20 SUBD 1.5500; ETHIODIDE M. 132-3DEGREES, WITH NA PICRATE GAVE THE CORRESPONDING PICRATE, M. 78.5-80DEGREES. SIMILARLY ETPCL SUB2 AND RMGBR GAVE 70PERCENT DIMESITYLETHYLPHOSPHINE (II), B SUB1 176-8DEGREES, M. 116-17DEGREES; ETHIODIDE, M. 278-80DEGREES, GAVE THE PICRATE, M. 170-1DEGREES. OXIDN. OF R SUB3 P WITH 4PERCENT H SUB2 O SUB2 GAVE 74PERCENT MESITYLDIETHYLPHOSPHINE OXIDE, B SUB1 150-2DEGREES, 1.040, 1.5480, AND 91PERCENT DIMESITYLETHYLPHOSPHINE OXIDE, M. 143-4DEGREES. I AND P,O SUB2 NC SUB6 H SUB4 N SUB3 IN ET SUB2 O AT 0-5DEGREES, FINALLY AT REFLUX 1 HR, GAVE I P NITROPHENYLIMINE (III), M. 118-19DEGREES; II ANALOG (IV), M. 188-9DEGREES. THE FORMER WAS UNSTABLE IN AIR, THE LATTER STABLE. IN MENO SUB2, III GAVE THE IONIZATION CONST. BY TITRN. (KOROLEV AND STEPANOV, (1968) PKA 15.95, AND COMPARED WITH 14.43 FOR IV, AND 15.72 FOR P,MEC SUB6 H SUB4 PET SUB2:NC SUB6 H SUB4 NO SUB2,P. THE CHEM. SHIFT OF PRIME31 P IN I WAS 19 PPM AND IN TRIMESITYLPHOSPHINE 39. THUS, THE EXCHANGE OF MESITYL FOR ET DOES NOT LEAD TO ANGLE DEFORMATIONS IN R SUB3 P. FACILITY: MOSK. KHIM.-TEKHNOL. INST. IM. MENDELEEVA, MOSCOW, USSR.

UNCLASSIFIED

USSR

UDC 547.558.1

STEPANOV, B. I., BOKANOV, A. I., and SVERGUN, V. I., Moscow Chemical-Technological Institute imeni D. I. Mendeleyev

"Spectral Properties and Structure of Tertiary Mesityl(ethyl)phosphines"

Leningrad, Zhurnal Obshchey Khimii, Vol 41 (103), No 3, Mar 71, pp 533-536

Abstract: Chemical and spectral properties of aromatic phosphines indicate absence of conjugation between aromatic substituents and the unshared pair of electrons at the phosphorus atom. Schindlbauer proposed that in case of tris-o-tolylphosphine the valence angles at the phosphorus atom are enlarged due to steric hindrance, the p-character of unshared electrons is increased and they become conjugated. An attempt was made to check this out on the example of trimesitylphosphine. The study showed that in the basic state the valence angles of the phosphorus atom in trimesitylphosphine molecule are not deformed the unshared electrons are not conjugated with aromatic nuclei, and the bathochromic shift observed in the UV spectrum is evidently due to the stabilization of an excited molecule.

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USSR

UDC 547.571+541.124

STEPANOVA, G. P., and STEPANOV, B. I., Moscow Chemical Technological Institute imeni D. I. Mendeleyev

"Intermediate Products in the Vilsmeier-Haack Reaction Using Hexachlorocyclotriphosphazatriene as the Condensing Agent"

Leningrad, Zhurnal Organicheskoy Khimii, Vol 7, No 5, May 71, pp 1013-1017

Abstract: Reaction of hexachlorocyclotriphosphazatriene with 3-(N-methyl-N-phenylamino)-2-propenal or 5-(N-methyl-N-phenylamino)-2,4-pentadienal gave respective addition products representing the first intermediate products isolated from the Vilsmeier-Haack reaction of the introduction of polyenal groups into aromatic or heteroaromatic compounds. The products were assigned the structure: $\{N_3P_3[O(CH{:}CH)_nCH{:}N^+(CH_3)(C_6H_5)]_6\}$. Treating the above reaction mixture with dimethylaniline or indole leads to the formation of N-methylaniles of p-dinethylaminocinnamic aldehyde, 5-(p-dimethylaminophenyl)-2,4-pentadienal, 3-(β-indolyl)-2-propenyl and 5-(β-indolyl)-2,4-pentadienal respectively, obtained as chlorides or perchlorates.

1/1

USSR

UDC 535.37

STEPANOV, B. I., KAZACHENKO, L. P.

"Universal Relationship Between Absorption and Emission Spectra Considering the Effect of the Solvent"

Minsk, Zhurnal Prikladnoy Spektroskopii, No. 5, May 71, pp 819-825

Abstract: A universal relationship between the absorption coefficient and the emission power derived earlier by the authors and presently used to calculate the properties of organic dye lasers is discussed. The relationship is valid in all cases when conditions used in the derivation process are satisfied. In certain cases it was established that temperatures determined on the basis of the spectra of solutions with the aid of the universal relationship differ from the temperature of the medium. This appears in viscous and frozen systems, especially in polar solvents for molecules with different dipole moments in the ground and excited electron states. Various reasons are advanced for the reasons for the difference in the temperatures of excited molecules and the medium. Some consider that thermal equilibrium of the oscillatory energy is not established in viscous and frozen systems during the excited state, due to a sharp decrease in the probability of its

USSR

STEPANOV, B. I., KAZACHENKO, L. P., Zhurnal prikladnoy spektroskopii, No. 5, May 71, pp 819-825

exchange between excited molecules and the medium. This conclusion does not agree with the independence of the quantum yield of luminescence from the frequency of the exciting radiation. The authors consider more reasonable the hypothesis that the discrepancy between calculated and experimental temperatures is explained by a change in the so-called configuration or orientation distribution of molecules of the medium after an act of excitation. A universal relationship is derived here that is applicable to such systems. The relationship is valid when the time for establishing orientational equilibrium is much less than the duration of the excited electron state. The new universal relationship replaces the old for those systems in which an act of excitation causes a rapid reorientation of molecules of the solvent accompanied by a change in the magnitude of the electron energy without a change in the shape of the potential surfaces. Experimental data are presented to support the validity of the relationship derived.

2/2

USSR

UDC: 547.269.351.1/.5=547.412.21/.25

GRYZLOVA, G. K., and STEPANOV, B. I., Moscow Chemical-Technological Institute imeni D. I. Mendeleyev

"Reaction of Hexachlorocyclotriphosphazatriene with Aromatic Sulfoacids in Presence of Dimethylformamide"

Leningrad, Zhurnal Organicheskoy Khimii, Vol 7, No 3, Mar 71, pp 619-621

Abstract: The reaction of aromatic sulfoacids and their salts with hexachlorocyclotriphosphazatriene (HCCPT) in the presence of dimethylformamide to yield corresponding sulfochlorides was studied. It was established that the cation of the sulfoacid salt had no effect on the reaction course. The optimal conditions for the reaction required that the ratio of the aromatic sulfoacid:dimethylformamide:HCCPT be 1:6:1. The sulfochlorides reacted with dimethylformamides forming stable addition products of the Wilsmayer-Haak type, which appeared to be inactive as formulating agents.

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USSR

UDC 547.571+547.551+666.718

STEPANOVA, G. P., BARTININKAS, R. I., STEPANOV, B. I., Moscow Chemical-Technological Institute imeni D. I. Mendeleyev

"A Condensation of Aromatic Aldehydes with Aromatic Amides of Acetoacetic Acid in the Presence of Hexachlorocyclophosphazatriene"

Leningrad, Zhurnal Obshchei Khimii, Vol 40, No 6, Jun 70, pp 1256-1260

Abstract: The reaction of benzaldehyde and o-nitrobenzaldehyde with the anilide, o-chloroanilide, and o-aniside of acetoacetic acid in the presence and in the absence of hexachlorocyclophosphazatriene (I) was studied. An excess of the aldehyde in chloroform was used. The reaction products were washed with water and purified by recrystallization. I acts as promoter of the condensation reaction of aldehydes with compounds containing active methylene groups. The proposed mechanism includes adduct formation with a positive charge arising at the carbonyl C atom of the carbonyl group so that the electrophilic activity of the aldehyde is enhanced. The adduct reacts then with acetoacetic acid amide, the phosphorus moiety is eliminated and the arylideneacetylacetamides are obtained. IR and UV spectra were obtained for identification of the products.

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APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R002203130009-1"

1/2 009 UNCLASSIFIED PROCESSING DATE--20NOV70

TITLE--NEW SYNTHESIS OF 4,4 PRIME,DIAMINO,2,2 PRIME,BIPHENYLYLENE DISULFIDE -U-

AUTHOR-(03)-ZHELTOV, A.YA., RODIONOV, V.YA., STEPANOV, B.I.

COUNTRY OF INFO--USSR

SOURCE--ZH. VSES. KHIM. OBSHCHEST. 1970, 15(2), 234-5

DATE PUBLISHED--------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--ORGANIC SYNTHESIS, AMINE, PHENYLENE, HETEROCYCLIC SULFUR COMPOUND, POLYNUCLEAR HYDROCARBON

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--3002/1147 STEP NO--UR/0063/70/015/002/0234/0235

CIRC ACCESSION NO--AP0128569

UNCLASSIFIED

2/2 009 UNCLASSIFIED PROCESSING DATE--20NOV7C

CIRC ACCESSION NO--AP0128569

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. (4,2,ACNH(HO SUB3 S) C SUB6 H SUB3) SUB2 WAS CONVERTED INTO THE DI,NA SALT, WHICH WITH 4.5 MOLES POWD. PCL SUB5 15 MIN GAVE 60.5PERCENT DISULFONYL CHLORIDE, DECOMPOSED ABOVE 360DEGREES, ALSO FORMED IN 35PERCENT YIELD WITH CLSO SUB3 H IN 4 HR AT 80DEGREES, AND AT 20DEGREES OVERNIGHT FROM THE DISULFONIC ACID. THE PRODUCT REFLUXED 15 MIN. WITH 55PERCENT HI IN ACOH, THEN HELD 1 DAY AFTER FILTRATION, GAVE ON NEUTRALIZATION AT 0DEGREES 43PERCENT 4,4 PRIME,DIAMINO,2,2 PRIME BIPHENYLYLENE DISULFIDE (I), M. 174-5DEGREES, ISOLATED VIA ITS HCL SALT. FACILITY: MOSK. KHIM. TEKHNOL. INST. IM. MENDELEEVA, MOSCOW, USSR.

UNCLASSIFIED

1/2 015 UNCLASSIFIED PROCESSING DATE--30OCT70

TITLE--REACTION OF ALDEHYDES WITH TERTIARY AMINES IN THE PRESENCE OF HEXACHLORO,1,3,5,2,4,6,TRIAZATRIPHOSPHORINE -U-

AUTHOR-(02)-TAKSIDI, V.KH., STEPANOV, B.I.

COUNTRY OF INFO--USSR

SOURCE--ZH. ORG. KHIM. 1970, 6(4), 815-18

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY, MATERIALS

TOPIC TAGS--ALDEHYDE, TERTIARY AMINE, CHLORINATED ORGANIC COMPOUND, ORGANIC PHOSPHORUS COMPOUND, PYRIDINE, ORGANIC COMPLEX COMPOUND, DYE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--2000/1949 STEP NO--UR/0366/70/006/004/0815/0818

CIRC ACCESSION NO--AP0125538

UNCLASSIFIED

2/2 015 UNCLASSIFIED

CIRC ACCESSION NO--AP0125538 PROCESSING DATE--30OCT70

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE TITLE COMPD. (I) IS AN EXCELLENT CONDENSING AGENT. E.G., I, BZH, AND PYRIDINE GIVE PHCH:NCH:CHCH:CHCHO (II) AND THE HEXAHYDRO DERIV. OF I. THE REACTION INVOLVES THE FORMATION OF A COLORED COMPLEX BETWEEN I AND THE REACTANTS, WHICH IS DECOMPD. WITH NA SUB2 CO SUB3 SOLN. TO II. IN THE CASE OF THE REACTION BETWEEN BZH AND PHNME SUB2 IN THE PRESENCE OF I 85PERCENT MALACHITE GREEN LEUCO FORM WAS OBTAINED. SIMILARLY, CONDENSATION OF 2,4,(HAO SUB3 S) SUB2 C SUB6 H SUB3 CHO WITH PHNET SUB2 GAVE THE LEUCO FORM OF ACID BRILLIANT BLUE. HEATING I, PHNET SUB2, AND HCHO GAVE 94PERCENT CH SUB2 (C SUB6 H SUB4 NET SUB2 P) SUB2. FACILITY: MOSK. KHIM.-TEKHNOL. INST. IM. MENDELEEVA, MOSCOW, USSR.

UNCLASSIFIED

1/2 033 UNCLASSIFIED PROCESSING DATE--30OCT70

TITLE--TIME DEPENDENCE OF THE LASING POWER OF ORGANIC DYES -U-

AUTHOR--STEPANOV, B.I.

COUNTRY OF INFO--USSR

SOURCE--DOKL. AKAD. NAUK SSSR 1970, 190(5), 1080-3

DATE PUBLISHED---------70

SUBJECT AREAS--MATERIALS, PHYSICS

TOPIC TAGS--DYE, CALCULATION, LASER PROPERTY, METASTABLE STATE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--3001/0020 STEP NO--UR/0020/70/190/005/1080/1083

CIRC ACCESSION NO--AT0125860

UNCLASSIFIED

2/2 033 UNCLASSIFIED PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AT0125860

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A RIGOROUS CALCN. IF GIVEN OF THE TIME CHARACTERISTICS OF LASING BY TAKING INTO ACCOUNT THE ACCUMULATION OF PARTICLES AT METASTABLE LEVELS. THE RESULTS SHOW THAT THE QUASI STEADY STATE EQUATION DESCRIBES THE PROCESS ACCURATELY. DEVIATIONS WERE FOUND ONLY FOR THE VERY 1ST MOMENTS OF LASING. EXPTL. DATA AGREE VERY WELL WITH THE CALCD. FACILITY: INST. FIZ., MINSK, USSR.

UNCLASSIFIED

1/2 023 UNCLASSIFIED PROCESSING DATE--30OCT70

TITLE--USE OF THE CHEMICAL POTENTIAL CONCEPT FOR DESCRIBING THE SPECTRAL PROPERTIES OF COMPLEX MOLECULES -U-

AUTHOR--(02)-STEPANOV, B.I., GRIBKOVSKIY, V.P.

COUNTRY OF INFO--USSR

SOURCE--IZV. AKAD. NAUK SSSR, SER. FIZ. 1970, 34(3), 513-17

DATE PUBLISHED--------70

SUBJECT AREAS--CHEMISTRY, PHYSICS

TOPIC TAGS--MOLECULAR SPECTROSCOPY, COMPLEX MOLECULE, OPTIC PROPERTY, SEMICONDUCTOR PROPERTY, ELECTRODE POTENTIAL, CHEMICAL ABSORPTION

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--2000/1142 STEP NO--UR/0048/70/034/003/0513/0517

CIRC ACCESSION NO--AP0124797

UNCLASSIFIED

2/2 023 UNCLASSIFIED PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AP0124797

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. AN ANALOGY BETWEEN THE OPTICAL PROPERTIES OF COMPLEX MOLS. AND OF SEMICONDUCTORS IS PRESENTED AND THE POSSIBILITY OF THE CALCN. OF THERMODYNAMIC FUNCTIONS FOR EXCITED AND NON EXCITED COMPLICATED MOLS. IS DISCUSSED. THE CHEM. POTENTIAL CONCEPT AND ITS USED FOR QUAL. DESCRIBING ABSORPTION AND RADIATION PROCESSES ARE EXPLAINED.

FACILITY: INST. FIZ., MINSK, USSR.

UNCLASSIFIED

UDC: 535.34/.37

USSR

STEPANOV, B. I.

"Applicability Limits of the Universal Relationship Between Absorption and Luminescence Spectra of Complex Molecules"

Minsk, Zhurnal Prikladnoy Spektroskopii, vol 17, No 2, 1972, pp 245-251

Abstract: The following expression for the connection between absorption and luminescence spectral bands is given:

$$\frac{W_{lum}(\nu)}{k(\nu)} = d(T)\nu^3 e^{-h\nu/kT},$$

a formula which has been given repeated experimental verification, although several violations of the formula have been detected recently in systems in which a change in the electron energy of excited molecules resulting from a change in orientation of adjacent solvent molecules is observed. The purpose of the present paper is to clarify the limitations on the applicability of the formula cited above and to restate the formula so that it is valid for particular cases. To do this, the author relies on results he obtained in an earlier paper in the same journal noted above (17, 1972, p 92)

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USSR

UDC 547.558.1 + 543.422

EDEL'MAN, T. G., and STEPANOV, B. I., Moscow Chemical-Technological Institute Imeni D. I. Mendeleyev

"Synthesis and Electronic Adsorption Spectra of Phosphazo Compounds"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 3, Mar 73, pp 551-553

Abstract: UV spectra of phosphazoazobenzenes have been studied. Absorption bands were identified in these spectra corresponding to the electronic transitions in the molecules of starting azobenzenes and p-nitrophenyldiphenylphosphine. No bands have been found corresponding to a single conjugated system in the phosphazoazobenzene. It has been shown that the introduction of a nitro group into p-position in respect to the phosphorus atom of the phosphazoazobenzenes has no effect to speak of on the transmission of the P=N bond. It is possible that the phenylazo groups in the phosphazoazobenzenes obtained act as electron acceptors interferring with the formation of a single conjugation system.

1/1

USSR

UDC: 621.391.837.32:681.84.083.84

NOZDRIN, V. V., PAV'SHIN, I. A., PODPALYY, Ye. A., STEPANOV, B. M., FABRIKOV, V. A., All-Union Scientific Research Institute of Opticophysical Measurements

"A Method of Increasing Contrast in Recording Optical Images on Strip-Domain Magnetic Tape"

Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 18, No 3, May/Jun 73, pp 217-218

Abstract: A method is described for increasing image contrast in thermal video recording on strip-domain magnetic tape. Before recording, the magnetic structure of the tape is oriented by an alternating magnetic field with amplitude exceeding the saturation field applied in the plane of the tape. The recording (domain-rotation) field is then applied perpendicular to the orientation of the initial domains. The film is heated by 0.03 μs neodymium laser pulses. As a result, the domain structure is rotated through an angle proportional to the density of the irradiation energy. Contrast at low intensity is increased by an order of magnitude over conventional recording methods.

1/1

USSR

UDC: 622.235

BORONIN, A. P., MEDVEDEV, YU. A., and STEPANOV, B. M., Moscow

"Extended Electrical Pulse and the Dynamics of the Expansion of the Explosion Products of an Explosive Charge"

Novosibirsk, Fizika Goreniya i Vzryva, Vol 9, No 4, Jul-Aug 73, pp 541-550

Abstract: The authors use statistical treatment to represent an entire set of pulses, which were obtained on the basis of a unified methodology which ensures small distortions in the studied time interval, in the form of a generalized dependence which describes the field pulses at various distances from the explosions of charges which are tens and hundred of grams in mass. It appears that the time dependence of the pulses is of self-similar nature and that the shape of the extended pulse contains particulars which correlate with the self-similar rule for the motion of explosion products. It follows that a low-frequency pulse is related to the products of explosion. Since existing materials on this problem, both theoretical and experimental, are not conclusive, the authors used optical observation of the expansion of the explosion products together with the registration of field pulses in that time interval where registration was comparatively simple.

1/1

USSR

UDC 538.561

KATYSHEV, Ye. G., PANASYUK, V. S., PANKRATOV, S. G., ROMANOVSKIY, V. F., SAMOSHENKOV, Yu. K., SOKOLOV, A. A., SPEKTOR, Ya. M., STEPANOV, B. M.

"Investigation of Electromagnetic Emission of a Modulated Electron Beam"

Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 42, No 11, Nov 72, p 2446

Abstract: The paper gives a block diagram and the parameters of an installation for studying velocity-modulated emission of an electron beam, as well as the results of measurements. The beam energy was 33 kev, beam current in the pulse 0.25 a, pulse duration 4 μs, pulse repetation rate 25 Hz, frequency of the modulating rf field 482 MHz, length of the emission region 55 cm, and pressure in the system 10^{-4} mm Hg. It was found that the emission power received by an antenna with effective area of 750 sq. cm at a distance of 2.5 m from the beam is 1 mw. The vector of intensity of the modulating electric field lies in a plane which passes through the axis of the beam. The ratio of emission intensity on the second harmonic to that on the first harmonic is approximately 5%.

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USSR UDC: 537.311

ANTONOV, YE. A., GNATYUK, L. N., STEPANOV, B. M., FILENKO, YU. I., and TSARFIN, V. YA., Moscow

"Study of the Electric Explosion of Conductors by the Holography Method"

Moscow, Teplofizika Vysokikh Temperatur, Vol 10, No 6, Nov-Dec 72, pp 1210-1213

Abstract: Experiments have been reported on the registration of various stages of the explosion of conductors [EC] in air and in water by the usual dual beam system using holographic method of double exposure. From the data obtained the rate of the scattering of fragments has been determined to be about 150 m/sec, the velocity of the shock wave -- 500 m/sec, and the concentration of electrons in the plasma -- $N_{e_{max}}$ $4.8 \cdot 10^{18}$ cm^{-3}. The holographic method is by far more universal and promising than the photographic method for the registration of the phenomena accompanying EC. The size of the subject being studied, the ability to study EC independently of the specific luminescence of the object, no requirements placed on high quality optical elements in the systems forming radiation streams, all these aspects favor holography for the registration of rapid processes occurring during electric EC.

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USSR

GINZBURG, V. M., et al., Radiotekhnika i Elektronika, Vol 17, No 10, pp 2219-2220

the variation of the index of refraction on the discharge axis and r_i is the radius of the plasma region. A numerical example is considered in which the effect of forcing the neutrals out of the discharge region is estimated. The basic errors in the quantitative estimates are connected with deviation of the distributions from axial symmetry.

The results obtained for a quasistationary discharge agree with the results obtained using a three-mirror interferometer under the assumption of uniform distribution of the electron concentration with respect to the tube cross section. The advantage of the introduced method is the possibility of investigating the initial discharge stages in pulse tubes where the three-mirror interferometer is inapplicable.

2/2

Pulse Technique

UDC 621.327.001.5

USSR APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R002203130009-1

GINZBURG, V. M., STEPANOV, B. M., FILENKO, YU. I.

"Study of Discharge in Pulse Tubes by the Holographic Method"

Moscow, Radiotekhnika i Elektronika, Vol 17, No 10, 1972, pp 2219-2220

Abstract: A study was made of the discharge of a pulse tube with an inside diameter of 7 mm, electron spacing of 80 mm, filled with xenon to a pressure of 400 mm Hg by the holographic method. The double exposure method was employed to obtain the holographic interferograms. The holograms were recorded on photographic plates with a sensitivity of 10^{-4} joules/cm^2 ($\lambda = 7 \cdot 10^{-5}$ cm) and a resolution of > 200 lines/mm. The effect of the thermal deformations of the shell during the first 200-300 microseconds of discharge on the interference pattern is insignificant. At later times the separation of the contribution of the plasma and the thermal deformations of the shell to the interference pattern presents great difficulty. During the first several tens of microseconds the discharge occupies an insignificant part of the shell cross section and it has higher electron concentration and temperature. Then it expands to the walls, but the total number of electrons in the cross section changes insignificantly. In the presented discharge interferograms with distribution of the index of refraction close to axisymmetric, the distribution is close to the type of $\Delta n_1 = \Delta n_{01} [1 - (r^2/r_1^2)]$ and $\Delta n_2 = \Delta n_{02} [1 - (r/r_2)]$ where Δn_{0i} is

1/2

Optics & Spectroscopy

USSR

UDC 548.52:535.4

GINZBURG, V. M., GUSEVA, I. N., KRAMARENKO, V. A., SEMENOV, E. G., SONIN, A. S., and STEPANOV, B. M.

"The Use of Holographic Interferometry to Observe the State of a Solution During the Growth of Single Crystals"

Moscow, Kristallografiya, Vol 17, No 5, Sep-Oct 72, pp 1012-1014

Abstract: The article shows that holographic interferometry can be used to study the state of a solution during the growth of KH_2PO_4 single crystals. The method used is that of bringing the object into coincidence with its virtual image, in which the recorded wave front interferes with the real wave front. The method makes it possible to obtain real-time holographic interferograms for any stage of the growth process and to take photographs and motion pictures of them. The use of diffused illumination of the crystallizer makes it possible to record the interferograms from various aspects, which permits an analysis of the volumetric distribution of the refractive index of the solution and from the known relation between variations in the

USSR

UDC 548.4

GINZBURG, V. M., GUSEVA, I. N., SEMENOV, E. G., SONIN, A. S., STEPANOV, B. N.

All-Union Scientific Research Institute of Opticophysical Measurements, Moscow

"On the Possibility of the Application of Holographic Interferometry to the Investigation of Crystals"

Moscow, Doklady Akademii Nauk SSSR, Vol 200, No 5, 11 Oct 71, pp 1092-1094

Abstract: The possibility of using the method of holographic interferometry for the investigation of crystals was shown by the authors on the basis of the example of fluorite. Used for obtaining holographic interferograms was the UIG-2 installation, developed at the All-Union Scientific Research Institute of Opticophysical Measurements. Data show that holographic interferometry makes it possible to obtain several different integral values for different observation angles of a single crystal. Due to the presence of an intensive coherent light source, the UIG-2 holographic installation makes it possible, in addition to interferograms, also to obtain a defraction-shadow pattern of inhomogeneity of the refraction index of the sample. It is comparable in sensitivity to a light pattern obtained by means of a special pro-

USSR

GINZBURG, V. M., et al, Doklady Akademii Nauk SSSR, Vol 200, No 5, 11 Oct 71, pp 1092-1094

jection type shadow installation. Thus, holographic methods may be used for complex research on growth defects: establishment of the shape of the crystallization isotherm, shape changes of the light wave under the influence of admixtures, stresses, etc. 3 figures, 1 table, 4 references.

2/2

USSR

UDC 548.4

GINZBURG, V. N., GUSEVA, I. N., SEMENOV, E. G., SONIN, A. S., and STEPANOV, B. M., All-Union Scientific Research Institute of Optical and Physical Measurements, Moscow

"Use of Holographic Interferometry For Crystal Studies"

Moscow, Doklady Akademii Nauk SSSR, Vol 200, No 5, 1971, pp 1092-1094

Abstract: An UIG-2 holographic device was used to study the morphology of crystal structures by obtaining interferograms of synthetic fluorite. The UIG-2 unit was developed at the All-Union Scientific Research Institute of Optical and Physical Measurements and its operating principle is as follows: a laser beam passes through a collimating system and is split by two mirrors into two equal intensity beams. Beam 1 is reflected by a third mirror to form a reference wave front and beam 2 is reflected by a fourth mirror and strikes a diffuser to form a signal wave front. Beams forming the reference and signal wave fronts intersect at a photographic plate to register the hologram. By comparing holograms obtained with the above UIG-2 unit with holograms taken on a Michelson interferometer it was evident that holographic interferometry makes it possible to evaluate heterogeneity of refraction

1/2

USSR

GINZBURG, V. M., et al., Doklady Akademii Nauk SSSR, Vol 200, No 5, 1971, pp 1092-1094

indices in the volume of a crystal sample. It is mentioned that with the use of an intensive coherent light source one can obtain diffraction-shadow pictures of diffraction index heterogeniety. With the use of holographic methods it is possible to study growth defects in crystals by establishing shapes of crystallization isotherms and the change in light wave forms under the influence of impurities, stresses, etc. The authors expressed their thanks to B. I. FEODOROVSKIY and Ye. N. LEKHTSIYER for their assistance. Three figures, one table, four bibliographical references.

2/2

USSR

UDC 621.383.29.032.11

ANDREYEVA, L.I., KAYDALOV, S.A., STEPANOV, B.M., TEREKHOV, B.I.

"Use Of Laser For Study Of Pulse Characteristics of Coaxial Photocells"

V sb. Izpol'z. optich.kvant.generatorov v sovrem. tekhn. i med. Ch. 2-3 (Use Of Lasers In Contemporary Technology And Medicine. Parts 1-2--Collection Of Works), Len.,1971,pp 33-36 (from RZh:Elektronika i yeye primeneniye),No 2,Feb 72,Abs.2A197)

Translation: The technique is described as well as the results of measurements of the pulse characteristics of coaxial photoelements (FEK), the FEK-09KP, FEK-14KP, and FEK-15KM, with the aid of a laser operating in a regime of synchronization of modes at a wavelength of 1.06 micrometer. With the aid of an optical divider, one and the same signal was directed to a number of FEK and to the input of a Type FER-2 electronoptical photochronograph and a Type TPI-1 calorimeter. The results of the oscillography of the electrical pulses from the output of the FEK were compared with the photochronograms obtained with identical sweep duration $\sim$ 30 ÷ 50 nsec. An analysis is made of the time resolution of the channel of oscillographic registration of pulses. 2 ill. 10 ref. N.S.

1/1

STEPANOV, B. M.

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SOME EFFECTS DURING THE PASSAGE OF RADIO WAVES THROUGH THE REGION OF AN EXPLOSION

[Article by V. A. Vel'min, V. F. Korets, Yu. A. Medvedev and B. M. Stepanov; Moscow, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, American, No 2, 1971, pp 136-139]

In this article we describe and interpret certain nonstationary effects observed in the passage of radio waves through the region of an explosion.

This interaction between radio waves and the region of an explosion is of interest in connection with the fact that study of such interaction may yield data on the processes within the explosion which could be obtained in no other way. The electromagnetic probe method possesses an unquestioned advantage over other methods (such as the simple probe method) in that, being essentially active, it does not exert a disturbing influence during the measurements (weak field).

In Figure 1, devoted to the interaction of radio waves of the centimeter range with the region of an explosion, it is shown that the specific shock wave is opaque, provided its velocity exceeds 2,4 km/sec. With any decrease in velocity, however, the shock wave becomes increasingly transparent. After a time, evidently, products of the explosion make their appearance, and the interaction of the waves with the explosion region becomes more complicated: apart from purely diffraction effects, such as appear as long as the shock wave remains ideally conductive, there sets in direct passage of the radio beams through the products of the explosion, and this in turn raises the question of the relative role of such effects in the mechanism of the interaction between wave and explosion produce. If the explosion happens to be irradiated exclusively through the cross-section of the beam, and if at the point of the explosion a small number of terminal Fresnel zones exists, then enlargement in the region of the explosion will result in stepwise superimposing of the Fresnel zones, which will lead to oscillation of the energy flow at the point of receipt, the oscillation period being determined by the speed of overlapping of

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TITLE--LUMINESCENCE OF AIR STUDIED UNDER THE ACTION OF FAST ELECTRONS -U-

AUTHOR-(05)-VAGIN, YU.P., KABANOV, G.L., MEDVEDEV, YU.A., NESHKOV, O.Z., STEPANOV, B.M.

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ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE LUMINESCENCE INTENSITY I SUBLUM OF AIR BOMBARDED WITH 2-4 MEV E PULSES (FROM A LINEAR ACCELERATOR) IS INDEPENDENT OF THE E ENERGY AND INCREASES LINEARLY I-3.5 ARBITRARY UNITS WHEN THE E CURRENT IN A PULSE IS INCREASED 30-110 MA, I.E., THE INTENSITY IS PROPORTIONAL TO THE ABSORBED DOSE RATE AND THE LUMINESCENCE OF AIR CAN THUS BE USED AS THE BASIS OF A NEW DOSIMETRIC METHOD.

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Photographic

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YEGOROV, YU. P., PAN'SHIN, I. A., STEPANOV, B. M., FABRIKOV, V. A.

"Photography on Magnetic Films of Large Size"

Moscow, Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, No. 6, Nov/Dec 71, pp 443-445

Abstract: An experimental study to test the possibility of recording an optical image of dimensions 50 × 50 mm^2 by low intensity light pulses (10^{-7} sec) on a magnetic film with a band domain structure are described. The possibility of applying thin ferromagnetic films with a band domain structure to photograph objects in a pulsed irradiation regime was shown in 1969. Radiant energy scattered from the surface of the object to be photographed is recorded by the magnetic film in the form of the distribution of angles of rotation of the domains in segments of the film with a different degree of irradiation. Nonselectivity of the magnetic films to the radiation wavelength in the thermal recording method makes it possible to record images over a wide spectral range, including the infrared, and the sensitivity over this whole range is comparable

1/2

USSR

to the sensitivity of photographic films. In the 1969 study recordings were made on an iron-nickel film of dimensions 15 × 15 mm^2. The light source was a neodymium glass laser in the free generation regime with a pulse length of 1 msec and the image was visualized by a magnetic colloid. For practical purposes it was of great interest to increase the dimensions of the recorded image and to decrease the exposure time. A special technique to keep the composition of the iron-nickel alloy constant over the entire surface of the glass substrate was developed that kept the deviation of the composition in the magnetic film from the composition of the initial alloy less than 0.2%. To reduce exposure time a method of sequential recording of individual sections of the image was applied, the boundaries of which overlapped. The rated heat diffusion from the exposed segments was large in comparison with the repetition rate of the pulses and therefore the cumulative effect on the overlapping sections of the film was eliminated. A photograph is given showing the image on a 50 × 50 mm^2 film.

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IVANOV, V. V., and STEPANOV, B. M.

"On the Problem of Diffraction of Short Waves Over the Surface of the Earth"

Moscow, Radiotekhnika i Elektronika, Vol 16, No 8, Aug 71, pp 1313-1322

Abstract: A physical interpretation is proposed for the high-frequency anomaly in the function of attenuation of electromagnetic waves in the case of diffraction over a spherical surface. This interpretation is taken as a basis in formulating rules for evaluating the high-frequency characteristics of the transmission path in the case of diffraction under complex conditions. The method is used for computing the diffraction of short electromagnetic waves in the model of the troposphere proposed by Carrol and Ring (Proc. I. R. E., 1955, 10). It is found that the high-frequency anomaly is sensitive to details of the assumed idealization of the transmission path.

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